Voice Activated Cockpit Management Systems, VACMS NextGen, from simple to complex architectures, Phase II

Completed Technology Project (2014 - 2014)

Project Introduction

Technological advances (GPWS, TCAS, FMS, WAAS, ESV, ADS-B) improved flight safety but engendered more complexity and increased pilot/computer interaction and workload with aviation accident rate unchanged for the past decade. Cockpit interactions would be safer and more efficient thorugh Voice Communication. Though Voice Recognition systems are becoming widely used, in flight environment conditions usage has been limited due to the unique challenges of elevated noise levels, specific cockpit lexicon, limited cockpit hardware, and lack of standardization. SouthernAir Aviation Inc. has developed a NextGen Voice Activated Cockpit Management system with applications for flight procedures, emergency procedures, control of aircraft systems and flight management systems. From simple to complex architectures, the system syncronizes software applications and aircraft systems in a unified model of both language and safety critical development environment to voice activate functions using NextGen Voice Recognition with heuristic pilot response. Procedures are enabled through wireless Bluetooth connection or wired communication. Additional tools of the system include a novel HMM Model comprising a decision management algorithm and synthetic lexicon for parsing and contiguous recognition. All the performance requirements are met within a 2% time-slice of a 700MHz Power PC processor and within 1 GB of memory. Unique key capabilities include: Automatic Lexicon Development, Phonetic Distance Analysis, Coarticulation Handling, Accent Tolerability. The NextGen advanced performance relies on allophone parsing and reduced recognition error with data processing in real-time, ideal for critical emergency situations. This system is remarkable in that it achieves very high recognition rates (98%) with a very large command set (131,000 unique words and thousands of word combinations). We gratefully acknowledge NASA SBIR Phase I Support.

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Southern Air Aviation, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Continued on following page.

Small Business Innovation Research/Small Business Tech Transfer

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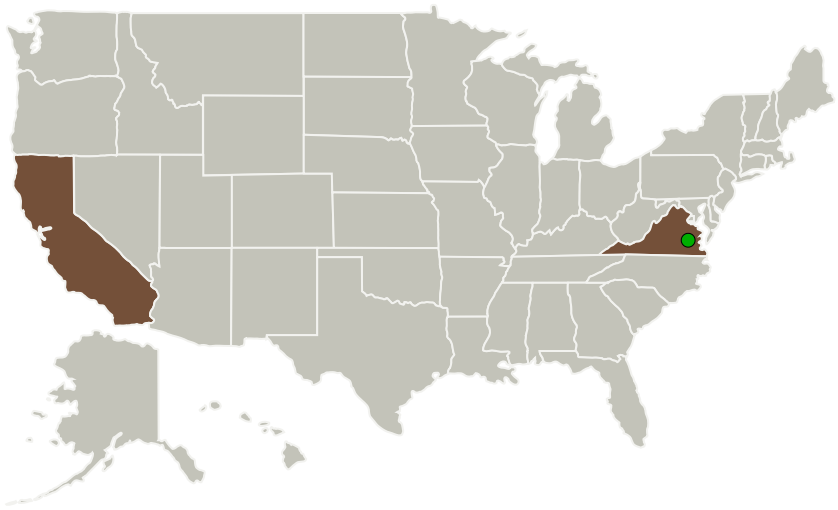
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Southern Air Aviation, Inc.	Lead Organization	Industry	Carlsbad, California
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
California	Virginia

Project Transitions

May 2014: Project Start

November 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137630)*

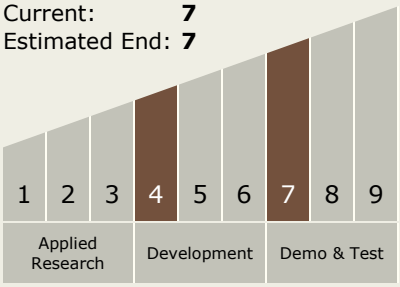
Project Management *(cont.)*

Principal Investigator:

Doinita Serban

Technology Maturity (TRL)

Start: **4**
Current: **7**
Estimated End: **7**



Technology Areas

Primary:

- TX16 Air Traffic Management and Range Tracking Systems
  - TX16.3 Traffic Management Concepts

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System

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Images

Project Image
Voice Activated Cockpit Management Systems, VACMS NextGen, from simple to complex architectures Project Image
(https://techport.nasa.gov/image/125931)